

"I hope you think I've made a change for the better," said the candidate.

"You've come over to my school, of course, and I suppose I am bound to think that a change for the better. Nevertheless I have a kind of idea that certain people ought to be Tories and that other certain people ought to be Whigs. What does your father say about it?"

"My father wishes me to be in the House, and that he has not quarrelled with me you may know by the fact that had there been a contest he would have paid my expenses."

"A father generally has to do that whether he approves of what his son is about or not," said the caustic old gentleman.

There was nothing else to be done. They all went back to the hotel and Mr. Spurgeon with Mr. Sprout and the landlord drank a glass of sherry at the candidate's expense, wishing him political long life and prosperity. There was no one else whom it was thought necessary that the candidate should visit, and the next day he returned to town with the understanding that on the day appointed in the next week he should come back again to be elected.

And on the day appointed the two young men again went to Silverbridge, and after he had been declared duly elected, the new Member of Parliament made his first speech. There was a meeting in the town-hall and many were assembled anxious to hear—not the lad's opinions, for which probably nobody cared much—but the tone of his voice, and to see his manner. Of what sort was the eldest son of the man of whom the neighbourhood had been so proud? For the county was in truth proud of their duke. Of this son whom they had now made a Member of Parliament they at present only knew that he had been sent away from Oxford—not so very long ago—for painting the Dean's house scarlet. The speech was not very brilliant. He told them that he was very much obliged to them for the honour they had done him. Though he could not follow exactly his father's political opinions—he would always have before his eyes his father's political honesty and independence. He broke down two or three times and blushed, and repeated himself, and knocked his words a great deal too quickly one on the top of another. But it was taken very well, and was better than was expected. When it was over he wrote a line to the duke.

"MY DEAR FATHER,—I am Member of Parliament for Silverbridge—as you used to be in the days which I can first remember. I hope you won't think that it does not make me unhappy to have differed from you. Indeed it does. I don't think that anybody has ever done so well in politics as you have. But when a man does take up an opinion I don't see how he can help himself. Of course I could have kept myself quiet—but then you wished me to be in the House. They were all very civil to me at Silverbridge, but there was very little said.—Your affectionate Son, "SILVERBRIDGE."

A FORERUNNER OF HARVEY.

MICHAEL SERVETUS, the Spaniard, whom Calvin burned in Geneva, discovered the circulation of the blood, or rather half of it; for in this case the process of discovery was very gradual. Moreover, he records his discovery in the very book, *Restitutio Christianismi*, the publication of which was the immediate cause of his being put to death.

William Wotton, "that prodigy of learning," says: "The first I could ever find who had a distinct idea of this matter was Michael Servetus, who was burnt for Arianism at Geneva one hundred and forty years ago. Well had it been for the Church of Christ if he had wholly confined himself to his own profession! He clearly asserts that the blood passes through the lungs from the left to the right ventricle, and not through the partition which divides the two ventricles, as was then believed. How he introduces it, I know not, having never seen his book myself. Mr. Charles Bernard, a very learned and eminent surgeon of London, who did me the favour to communicate this passage to me, could inform me no further, only that he had had it from a learned friend of his, who had himself copied it from Servetus."

How a prodigy of learning, who at four years old read Hebrew, Greek, and Latin, and who in his *Observations on the Tale of a Tub* measured swords with Swift, could be satisfied with hearsay, it is hard to tell. But so it is; the fact has been repeated in every English biographical dictionary since Wotton's day. Servetus deserves something more than this. Had he not been cut off in his prime, he might very probably have either completed the grand discovery or have guided the Paduan

anatomists, Vesalius, Colombo, and Cesalpinus, who each came a little nearer the full truth than his predecessor, but had not courage or good luck to "finish the circuit," as the English pupil of Fabricius of Acquapendente did.

Servetus's is a sad story. When quite young, a student at Toulouse, this enthusiastic Navarrese got hold of the religious doubts which were in the air. Southerners, Spaniards and Italians, in the lands where the new faith was soon to be stamped out, were going in generally, like Bruno, for nothing more than heterodox doctrines; among Dutch and Rhinelanders the new views tended to socialism, sometimes of a terribly practical form. Servetus, bred-up in the south, travelled northward, and purposed going the round of all the German universities. At Basel he published a tract, *De Trinitatis Erroribus*. It was very youthful; and in a subsequent work on the same subject he candidly confessed that, though not wrong, he had been hasty, and had written crudely. The Reformers fell on him like a pack of wolves. Melanchthon was specially indignant, called him crafty, confused, and (worst epithet of all for a scholar and a theologian), *homo levis*, a man wanting ballast, as we say. Servetus was astonished that those who claimed the freest right of protesting against what they held to be Popish errors, should deny him the like freedom in arguing against what he deemed errors about the Trinity. But though the Germans gave him a very cold shoulder, his works were eagerly read in Italy; so much so, that Melanchthon wrote to the Senate at Venice begging them to beware of such horrible and soul-destroying heresies.

Unappreciated in Germany, and, moreover, poor, Servetus came across into France and practised as a physician, partly at Lyons and partly at Vienne, keeping up for sixteen years a friendly correspondence with Calvin, sending him a tract now and then to ask what he thought of it—a frankness which the "inexorable logician" repaid by bringing out at the trial private letters and papers which had come to him in this confidential way.

He became very successful in his practice, but could not keep his hand out of theology; and publishing, in 1553, at Vienne, his *Restitutio Christianismi*, he was clapped into prison, and would assuredly have been burnt had he not managed to escape. As it was, he was burnt in effigy along with five bales of his

books. Naturally he turned to Italy, where he had already many mind-children; but the high-road to Italy was through Geneva and as soon as he arrived there Calvin denounced him to the magistrates, and had him taken up as a dangerous heretic.

There is some doubt whether Servetus asked and Calvin refused a "safe conduct." This he would hardly have thought necessary from the old correspondent who has so long been affectionately trying to convert him. It is too true that Calvin wrote to Farel (Grotius saw the letter): "I hear he's coming. If I have any power, I shall suffer him to escape unscathed" (there is a doubt whether it is *salvus* or *vivus*; comes to much the same thing). The trial was a solemn farce. Calvin had determined not to let his adversary get off. Some of the charges were simply ridiculous. Servetus, long before, had published an edition of Ptolemy's *Geography* in which he had said: "Judæa is not the miracle of beauty and fertility which has been described. Travellers tell us it is poor, and barren, and unpleasant." This, said the accusers, convicts the man of blasphemy; he goes out of his way to make out that Moses is a liar. Amadeus Gorrius alone, of the whole Genevese Council, pleaded for a fairer trial—for bringing the accused before the Assembly of Two Hundred. The Geneva magistrates sent round for advice to the magistrates of all the other Protestant cantons; but all agreed that the heretic ought to die, and he was burned at a slow fire on October 27, 1553, fulfilling more literally than he expected his own prophecy: "Good God, what tragedies these questions, Whether the Word and the Spirit are persons or substances, will cause by-and-by."

Servetus's religious views were not openly advocated in Italy. There the Reformers could not expect the immunity which he at Basel had thought was his right among protesting Switzers and Germans. But in Italy, at that time the home of science, his scientific theories had taken deep root; the *Restitutio* had been in MS. since 1540, and had doubtless been shown to many Italian sympathisers. A thousand copies, too, had been struck off in 1553 and though many were burnt at Vienne and Frankfort, and one printed and one MS. copy were put on the pile on which he suffered at Geneva, many must have escaped. These were studied to some purpose; and, two years later, Vesalius in a new edition of his own book, quietly

inserted one of Servetus's great discoveries—that the septum of the heart (membrane between the ventricles, through which everyone since Galen had said the blood flowed) is really imperforate. Vesalius uses the very words of Servetus, but he takes care not to name him; it would have been a mortal sin to say that he was beholden for the discovery to a condemned heretic.*

Before long, in 1559, Realdo Colombo described pulmonary respiration so exactly that, by-and-by, when Primrose fell foul of Harvey, he accused him of bringing forward without new proof the opinions of Colombo. But Colombo, like Vesalius, uses the very words of Servetus, though he adds: "No one has hitherto described this, or even hinted at it." The fear of the Inquisition made him disloyal to him whose opinions he had not scrupled to appropriate.

This is the limit of Servetus's discoveries: that the septum is imperforate, and that the blood passes from one ventricle to the other by way of the lungs,† thereby getting changed in colour from black to red. From this to the complete circulation there seems only one step; but that step took a long time. Cesalpinus, professor at Pisa, physician to Clement the Eighth, hopped his leg nearly across the gap. He actually began doing what Bacon says is the only way to scientific discovery, and what all the old world scientists were so very shy of attempting: he began to experiment instead of arguing.

Tying up an arm, he saw that the veins well below not above the ligature. "How is this?" he asked. "It would be just the other way if the blood in the veins flowed from the heart to the extremities. It clearly flows through the veins to the heart, and not the other way. There it receives its final purification, and then the arteries carry it all through the body."

Of his undoubted debt to Servetus and Colombo, Cesalpinus was discreetly silent. Pope's physician as he was, he was accused of atheism, and Father Sarpi, himself an anatomist, writes mysteriously of "some to whom a secret has been revealed by Satan

himself" on the subject. It was dangerous ground, and men looked to their own footing, regardless of their debt of gratitude to those who had guided their steps.

Had Cesalpinus lived in a free country there can be no doubt he would have written a book like Harvey's; he used the word circulation, and understood the thing; but, as the new view was contrary to the time-honoured dicta of Galen, he merely notified his discovery without enlarging on it; failing to finish the step, he stood as it were with one leg in mid-air.

The great glory of Harvey's book—"the finest book on physiology ever written," Flourens calls it—is that it says good-bye once for all to theories and dissertations, theological, metaphysical, and scholastic, and goes in for fact. Herein many see the value of the Baconian philosophy, for though the *Novum Organum* was not published till 1620, only nine years before Harvey's treatise, yet the ideas which Bacon urges with such force had for some time been in the air. As M. Charles Richet, who has lately written an excellent monograph on Harvey, puts it: "Bacon's book is, so to speak, the apotheosis of the experimental system; Harvey's book proves in one glorious instance its advantages." Even Harvey wrote a good deal out of deference to old prejudice; page after page is taken up with proofs that Galen cannot be right. Galen had to be dealt tenderly with; he was almost as great an authority as Aristotle; and to both attached a sort of ecclesiastical sanctity. But, at the same time, Harvey was always experimenting, and his work is in the main a record of observed facts. Servetus and a good many others had formed a true notion about the circulation of the blood; Harvey proved it to demonstration. Before his death in 1657, at the ripe age of eighty, he had seen his views adopted by the chief physicians in Europe. His life had been uneventful enough. Born at Folkestone in 1578, he went from Cambridge to Padua, where he stayed several years. In 1609 he was made physician of St. Bartholomew's Hospital, and lecturer on anatomy at the Royal College of Surgeons, and as early as 1615 he taught the views which he had doubtless imbibed in Italy. He was physician of Charles the First, and so far shared the king's fortunes that his house was pillaged by a London mob; a MS. on the structure of insects being among the papers destroyed.

* Careful as he was, Vesalius did not escape the Inquisition. He was accused of vivisection and had to make an expiatory pilgrimage to the Holy Land, as he was returning from which he perished by shipwreck.

† That Servetus says the blood goes from left to right by way of the lungs, instead of the reverse way, is due to his having only imperfectly conceived the "greater circulation."

At first, despite the apologies with which his treatise opens, and the unbounded respect for Galen which he always expressed, he was violently attacked, and his practice fell off; patients lost faith in him. Primrose, one of his chief opponents, wonders how he, on the strength of a few dissections of snails, and bees, and crayfish, can venture to question the authority of Aristotle, whose mighty genius had taken in all the realm of nature. Others boldly denied his facts. He had remarked that the contraction of the heart produces an audible sound, as everyone knows who has used a stethoscope. "Perhaps it is so in London," was the reply of some country physicians; "but down here nothing of the kind has ever been heard." It is no use quoting the abuse which was lavished on both sides; for Harvey was as good a hand at mud-flinging as his adversaries. "You cannot hinder dogs from barking or vomiting," he writes; "it is their nature to. And so among scientists there is always a percentage of cynics. The thing is to take care that their bites, let them grow as mad as they may, do not hurt the foundations of truth. They will get no readers; for a just God does not grant to the wicked the precious gift of wisdom." *Odium scientificum*, as we find even nowadays, sometimes makes men as bitter as if they were rival theologians. In France Descartes wrote strongly in favour of the new views. "Let anyone," he says, "who is not blinded by the authority of the ancients just open his eyes and examine Harvey's opinion. He will see for himself that it is true." The *Faculté de Paris*, however, rejected Harvey's view as late as 1660; and we remember how, twelve years later, one of Molière's physicians says that he will not even listen to the pretended discoveries about circulation.

Harvey had done his part; but still, to complete the whole matter, several generations of experimenters were needed. Eustachi, as early as 1553, had discovered in the thorax a chyle-bearing vessel. Aselli, at Pavia, in 1622, found that the stomach of a dog killed soon after it had been fed was covered with vessels full of white liquid. In 1626, Pieresc, at Aix, found the same in the case of a criminal dissected soon after execution.

Pecquet, a young doctor at Dieppe, traced, in 1640, the connection between Aselli's chyle-veins and Eustachi's tube. But chyle, lymph, blood, the connection

between them, and the true absorbing power of the veins, were only fully worked out by Magendie in 1820.

It is interesting to note something about Galen, who really was a great man—the first experimenter properly so-called (though Aristotle studied animals very carefully), the creator of physiology, and Hippocrates was the creator of medicine. The history of these early scientists shows how fatal is a false step at the outset. Better Aristotle had never experimented at all, for one of his experiments perpetuated an error which, sheltered by his name, lasted on, and was constantly thrown as an irrefragable truth in Harvey's teeth. To cut up the trachea of a dead animal and blow in air through a tube, you will see this air pass by the pulmonary vein into the heart. Hence Aristotle, and Galen after him, accepted as an admitted fact the entry of air into the heart. The heart is the source of heat, and by this heat changes the food into blood, and the air goes to the heart to cool the blood. These two things are alike needful: heat to turn the food into the blood which is the life, coolness to prevent the heat from burning up the heart. So far Aristotle. Galen set up the liver in that place of vantage which Aristotle had assigned to the heart. The food element, says he, pass through the veins into the liver, and thence to the heart, which receives air from the lungs—exactly Aristotle's error—and (here his own mistake comes in) this mixture of nutritive particles with the air takes place through the pores of the septum, which we have said is really not porous. These imaginary pores of the liver grew into visible orifices, when, owing to the cessation of sacrifices at the temple and the stagnation of learning, men left off investigating for themselves. Everybody said the same thing; till at last Berengarius of Carpi, confessed that these orifices could not be seen by the human eye, and then Servetus, finding the passage through the septum was all imaginary, was led to follow the movements as they really went on. Galen did not, like Aristotle, fail to draw a distinction between nerves and arteries; he noted the working of the valves of the heart; he saw that the arteries contain blood and not air, in spite of Erasistratus's experiment—you can prove anything by experiment, if you have made up your mind first. But, nevertheless, he believed in a porous septum; he thought that the lungs sent air to the heart; he believed the liver to be

grand reservoir of blood, whence all the veins originated.

The subsequent history of anatomy is a warning against taking for granted the experiments even of the grandest discoverers. Galen had been a patient investigator. In those strange days, so hard to reproduce to the mind's eye, when people went to church, not to sit or kneel, and sing and pray, or listen to praying and singing and preaching, but to see beasts slaughtered and then eat part of what had been killed, Galen was an assiduous church-goer. The priest killed the victim, the soothsayer watched its dying throes, cut it open, and took out and examined its heart and liver, thence judging of what was going to happen to those who had offered it. But Galen's object was different; he studied heart and liver, not to forecast the future but to find out how the functions of life were carried on. And he found out a good deal. The worst of it was, he thought he had settled everything, and his successors took it for granted that he had. By-and-by victims ceased to be offered; not so very long after Galen's time, for he was born about 130 A.D., his father being an architect, his mother a scold, of whom he tells us (for he tells everything about himself) that she used to fly into a passion and bite her maids and quarrel with her husband more than Xantippe ever did with Socrates. Saints took the place of tutelary deities; incense and the "bloodless sacrifice" of the mass were substituted for sheep and oxen; and soothsaying, which used to be a part of the national and social life of heathenism, was strictly forbidden by council after council of the Church.

So there was no more chance of examining hearts and livers; and the faculty was quite content. Had not Galen done it for them? Was it not blasphemy to doubt such authority; and would it not be casting doubt on him to go through his experiments for themselves? And so generation after generation went on repeating the old facts, commenting on the old books, trashing the oft-thrashed chaff, treating physiology as if it were a branch of geology, with Hippocrates and Galen for canonical books, out of which all texts were to be taken.

At last came the "Renaissance," and then necessarily followed the Reformation; and, when we consider how men's minds had been bound down to texts, it is perhaps altogether to be wondered at that the first man who freed physiology from Galen

and his commentators was a heretic. Even Protestants had not got free (alas! they are still by no means free) from slavery to texts; and, without freedom to experiment and to prove by fact the fallacy of the old texts, no advance in physiology was possible.

CATCHING CETEWAYO.

A SOLDIER'S STORY.

IF you look at Hart's Army List for 1879 you will see that we are designated as the First (The King's) Dragoon Guards, and that we carry the king's cipher within the garter, and are entitled to the words, Waterloo, Sevastopol, Taku Forts, Pekin; which means that we have served at Waterloo, in the Crimea, and in China.

Our colonel is General Hankey, who commenced his military career fifty-six years ago, and our commanding officer is Lieutenant-Colonel Alexander, who marches at our head; but the officer most especially connected with the deed about to be related is Major J. R. C. Marter, who has been in active service some twenty-eight years.

After our return from the East, in 1866, we did garrison duty at home until the disaster at Isandlana awakened the government to a sense of the situation, and we were told off for service in Africa. It need hardly be said how gladly we hailed the opportunity which seemed to be offered. Garrison life at its best is but weariness and vanity, and every soldier jumps at a chance of active service; but when we arrived in Natal, we found the prospects of active service but little improved, for instead of being sent to the front, as we hoped and expected, we were kept in barrack, and confined to the dull routine of barrack life. We heard of Lord Chelmsford's victory, but we had no share therein, although Sir Garnet Wolseley had said it ought to have been a cavalry campaign. We, however, had only to obey orders, which we did, and at last our turn came. Ulundi had been fought, and the Zulus beaten; but Cetewayo, the Zulu king, was still at large, and, with the power of organisation which he undoubtedly possessed, he was still a dangerous foe. Sir Garnet declared that until he was taken there could be no peace. By this time we were at Ulundi, doing garrison duty there; it was merely a change of scene, and a change for the worse. However, this problem was set: Required to

find peace; Sir Garnet's solution—catch Cetewayo. How was it to be done? We were to remain at Ulundi until it was.

Patrols were sent out in all directions; patrols of all sorts, sizes, and descriptions. Now patrols generally consist of about six mounted men; but the patrol with which I went out consisted of a squadron, under Major Marter; being two troops of ours (the K.D.Gs.), some of Lonsdale's Irregular Horse, known as the Marine Cavalry from their being composed of men from the transport ships, and a company of the Native Contingent. These latter were uniformed in red tunics and blue trousers; but they wore the trousers not as such garments are usually worn, but round their waists, tied by the legs with the body behind; they were armed with Martini rifles, but carried assegais and shields as well; as none of them understood sighting their rifles, and were besides somewhat given to firing "promiscuously," they were rather more dangerous to their friends than their foes. In addition to all this they had a dread of the Zulu which rather detracted from any confidence one might otherwise feel disposed to place in them. Such was our patrol.

There was also another out under Lord Gifford, consisting of Natal Light Horse, Fingoes, and Mounted Basutos; which latter were fine plucky fellows, riding wiry little ponies, which they prized as cavalrymen should prize the steeds which carry them.

Whalley's Horse, a body of the same character as Lonsdale's, some of whom accompanied us, completes the list of cavalry in the field—all having the same task, to catch Cetewayo.

Our orders were to patrol the country from Port Victoria, at the foot of the Magnum Bonum Mountains, to Fort Kamagwassa, on the South Column Route, throwing out a chain of videttes in order to (as was said) prevent Cetewayo making his way into the bush country at the back of Isandlana, called Middle Luff; but seeing that the videttes were to be half a mile apart, it is somewhat difficult to understand how they were to stop Cetewayo supposing he attempted to pass in the night time. We had no sooner carried out our orders than news came that Cetewayo was going north and not south, and we had to return to Ulundi to be ordered to a camp on the Black Umvolosi, about twenty-five miles beyond Ulundi, where there was a column under

Colonel Clark. [This occupied three more days and nights.

The gentle reader who imagines that this patrolling partakes of the character of a march out, with which our volunteers are so familiar, ought to have his or her gentle mind disabused on this subject. We do not sleep under canvas, or any shelter whatever. Our men, each one for himself, carried three days' provision in his haversack—biscuit, hard as flint, and tinne meat—a blanket and overcoat on his saddle, and a blanket under his saddle for his horse. These, with horse fodder and cooking utensils on mules, constituted the whole of our equipment during our search for Cetewayo. There is no great hardship in sleeping "sub Jove" in Southern Africa during the first hours of the night, for the beautiful clear sky, and the bright shining stars, succeeding to the hot scorching sun, make the idea remarkably pleasant; but when the dew descends, it does towards early morning, neither blanket nor overcoat is sufficient to prevent the chill from reaching the vertebrae bones. But apart from this the ground in South Africa teems with insect life—spiders, earwigs, ticks et hoc genus omne, abundant and very unpleasant they make themselves especially the ticks, which attach themselves to man and horse alike, not to be dislodged until they have exacted the due in blood to the full extent of their capacity. Amid discomforts such as these the pipe affords a solace not to be despised, and the veriest enemy of tobacco—even the author of the Counter Blast himself, would hardly have begrudged us this indulgence.

Here is something like an average day. At first signs of daybreak, before the light appears, preparations are made for the start; fires lighted, coffee made, horses saddled, and at daylight we are off again through a country interspersed with prickly aloes and thorn bushes; here and there rocks; and then grass ten feet high sharp as a razor, with the ground full of ant-bear holes. Now the journey is diversified by chasms and hollows, varying from two to fifty feet wide; then we have to pass along a sandy, rocky track, which at times forms the bed of the river; then in order to increase the variety, we come across a bog, in which we are lucky not to get engulfed; and, worst of all, is waitabit-thorn, which levies contributions on us as we pass as quickly as we can. Now we come to a mountain, up which